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Applicant : Steffen BRUNNER et al.

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For : EXHAUST GAS HEAT EXCHANGER AND METHOD FOR THE PRODUCTION THEREOF

Group Art Unit : 1732

Examiner : Allen J. Flanigan

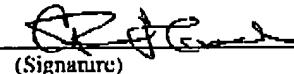
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PROTEST UNDER 37 CFR 1.291

This is the first protest submitted in the present application on behalf of the real party in interest who is submitting the protest.

Listing of Documents Relied Upon

Publication 1 JP 09 310996 A 2 December 1997

Publication 2 JP 63 137595 A 9 June 1988

Publication 3 JP (utility model) 01 131969 A 7 September 1989

Copies of Publications 1, 2, and 3 are appended hereto with an Information Disclosure  
Citation form and English translation of relevant portions thereof.

Reason for Protest

The invention claimed in the present application is unpatentable in view of publications 1, 2 and 3 under 35 U.S.C. 102(a) and/or 102(b) and/or 103(a).

The claims of the present application as published

The invention recited in claim 1 of the present application is: "An exhaust gas heat exchanger for motor vehicles, comprising a pipe bundle of exhaust pipes (10) which are welded at the ends of the pipe bases (7), and a housing casing (2) which is welded to the pipe bases (7), characterized in that the pipe bases (7) are welded to the housing casing (2, 3b) via a circumferential bead (11) which is arranged at the end."

The invention in claim 2 of the present application is: "The exhaust gas heat exchanger as claimed in claim 1, characterized in that the pipe bases (7) have a raised rim (7a), and the housing casing has ends (3b) in that the rims (7a) and the ends (3b) are arranged flush and are connected by means of the circumferential bead (11)."

The invention recited in claim 3 of the present application is: "A method for production of an exhaust gas heat exchanger as claimed in claim 1, characterized in that pipes (24), pipe bases (22, 23) and the housing casing (21) are joined to form a heat exchanger block (20', 20''), in that the block (20', 20'') is held in a clamping apparatus, and in that both the housing casing (21) and the pipe bases (22, 23) as well as the pipes (24) and the pipe bases (22, 23) are welded to one another at the ends in a jig."

CONCISE EXPLANATION OF THE RELEVANCE OF THE PRIOR ART DOCUMENTS  
SUBMITTED HEREWITH

Relevant Contents of Publication 1

The publication 1 (JP 09 310996 A) relates to an EGR gas cooler. As described in lines 1-4 of paragraph No. [0002] of the publication 1, the EGR gas cooler is an apparatus that takes a part of exhaust gas out of a exhaust system and returns it again to the induction system to be added to a fuel-air mixture, and is the same apparatus as "the exhaust gas heat exchanger for motor vehicles" in the claims of the present application.

Fig. 1 of publication 1 shows the whole cross-sectional view of the EGR gas cooler, and in lines 1-6 of the paragraph No. [0012], it is stated that "As shown in Fig. 1, as to the multi-tube type EGR gas cooler 30 of the present invention, in a shell body tube 31, both ends of a group of heat exchanger tubes 32 are stabilized by brazing or welding with a plate metal tube sheet 33 and, on the

other hand, the outer periphery of the tube sheet 33 is fixed and arranged by brazing or welding with an inner wall 34 of the tube 31,...."

Further, Figs. 2-4 of the publication 1 show other embodiments, that is, variations of the fixing method shown in Fig. 1. In particular, as to Fig. 4, in paragraph No. [0015] (in the fifth line from the bottom downward of page 3, column 4 of the publication) it is stated that "....as shown in Fig. 4, the outer periphery of the tube sheet 33 is bent parallel to the centerline of the shell body tube 31 and engaged with the enlarged part in diameter of the shell body tube, ...."

#### Relevant Contents of Publication 2

The publication 2 (JP 63 137596 A) describes a laser seal welding method (a welding method using laser beams). Fig. 1 of the publication 2 shows a laser seal welding system and in page 2, lines 1-20 of the right upper column of the publication it is stated that "Here, Fig. 1 is an illustrative drawing of laser seal welding of tubes of a heat exchange high pressure feed water heater to a pipe plate. In the drawing, 21 represents the tube, which is to be subjected to laser seal welding to a pipe plate 22. Near these tubes 21 and pipe plate 22, an NC gantry type robot 23 driven in X-Y-Z directions is arranged. On the robot 23, optical path systems 24 and 24', mirrors 25 and 25', a laser processing head 26 and a TV monitoring device 27 are installed. Next, operation of the system will be described. First, laser light 28 is sent forth from an oscillator (not shown) as a light source, which passes through optical pass systems 24, 24', changes direction on mirrors 25, 25', and lead to the laser processing head 26. The laser light 28 is converged via a convergent lens and irradiated on

work surface 29 as laser light 28 with high energy density. In this connection, drive of the laser light 28 in circumference direction is carried out by the robot 23 to make welding with high accuracy and high speed possible."

#### Relevant Contents of Publication 3

The publication 3 (JP (utility model) 01 131969 A) describes structure of TIG welding between an outer barrel and an end plate of a heat exchanger used for a water heater or a hot-water boiler, and structure of TIG welding between the end plate and an inner barrel. Simultaneously, structure of TIG welding between the end plate and tubes is also suggested.

Fig. 2 of the publication 3 shows a flue type heat exchanger and Fig. 4 is an enlarged drawing of a portion in Fig. 2. Further, Fig. 3 shows a smoke tube type heat exchanger, in which joining state of an end plate 12 and an outer end portion 13 is shown. The heat exchanger in Fig. 3 has such constitution that, similar to that of the present invention, exhaust gas circulates in plural smoke tubes 11 and water is filled around the outer periphery of the tube 11. The joining state of the end plate 12, the smoke tube 11 and the outer barrel can be imagined, although not shown clearly, to have a structure pursuant to that of Fig. 4.

In page 1, line 6 from the bottom to page 4, line 3 of the publication 3, it is stated that "(Prior Art) Generally, a water heater and a hot-water boiler are provided with such heat exchanger made of stainless alloy as shown in Figs. 2 and 3. That is, Fig. 2 shows a flue type heat exchanger and Fig.

3 shows a smoke tube type heat exchanger. The flue type heat exchanger shown in Fig. 2 has fundamental structure described below. That is, the inside of a heat exchanger main body 1 is provided with a water channel 4 formed along the periphery of the main body 1 between an outer barrel 2 and an inner barrel 3, and a flue 5 formed heat-conductively to the water channel 4 inside the inner barrel 3. At the under portion of the outside of the main body 1, a water supply port 6 leading to the water channel 4 and a burner port 7 are welded, and at the upper portion thereof, a drain port 8 leading to the water channel 4 and an exhaust port 9 leading to the flue 5 are welded. In the water channel 4, water 10 is filled, which becomes hot water by heat having been generated by a gas burner 11 thrown through the burner port 7 and ignited and transmitted via the inner barrel 3. In this connection, plural plate-like members 5a... laterally arranged in the vertical direction in the flue are buffer plates for enhancing the heat exchange ratio. The smoke tube type heat exchanger shown in Fig. 3 is constituted such that the water channel 4 heat-conductively surrounds side peripheries of plural smoke tubes 11..., whereby water 10 flown into the water channel 4 from the water supply port 6 at the under portion of the main body becomes hot water. In Fig. 3, 7 and 9 show a burner port and an exhaust port, respectively, communicating to the smoke tube 11.... Further, at the top of the main body 1, there is a water supply port referred to as 8.

Furthermore, some of these heat exchangers are provided with an end plate 12 in a rail shape at both of upper and under ends of the water channel 4 along the water channel 4. The end plate 12 is formed by press-processing a metal plate such as stainless alloy into a cross-sectional shape of letter U, and serves so as to resist water pressure and vapor pressure working on the main body 1. An inner curvature radius of a fold of the end plate 12 is around 1-2 mm. The end plate 12 is welded

to the outer barrel 2 and inner barrel 3 at an outside marginal portion 13 and an inside marginal portion 14, whereby structure near the welded portions is as shown in Fig. 4. That is, Fig. 4 represents an enlarged drawing of the part surrounded by circle A in Fig. 2. The end plate 12 is TIG welded to the outer barrel 2 and inner barrel 3 at respective end portions of opposing outside part 13 and inside part 14.

Here, regions referred to as 15, 15 in the drawing are welded portions. The end plate 12 is press-fitted between the outer barrel 2 and the inner barrel 3, whereby the outside part 13 and the outer barrel 2, and the inside part 14 and the inner barrel 3 are surface-contacted with each other, respectively, over the range referred to as B in the drawing (around 5 mm) so as not to generate a gap."

Here, in the above description, there is no illustration for the smoke tube type heat exchanger in Fig. 3 about a portion corresponding to a portion of the flue type heat exchanger shown in Fig. 2, but a welded structure of the end plate 12 and the outer barrel 2 and smoke tube 11 in Fig. 3 can be imagined to be similar to that in Fig. 4, or such structure can be easily invented by a person skilled in the art on the basis of the structures in Figs. 2 and 4. In other words, since it can be evaluated that the end plate 12 of the flue type heat exchanger in Fig. 2 and the end plate 12 of the smoke tube type heat exchanger in Fig. 3 are elements having the same function, an invention, in which a welded structure of the end plate 12 and the outer barrel 2 of a smoke tube type heat exchanger is formed to be the same as structure in Fig. 4 and, simultaneously, a welded structure of the end plate 12 and the smoke tube 11 is formed such that the inner barrel 3 in Fig. 4 is replaced

by the smoke tube 11 and a portion to be welded is TIG welded similar to Fig. 4 to form the welded portion 15, would have been obvious to one of ordinary skill in the art.

Comparisons of the Claims of the Present Application with the Disclosures of the Publications

Claim 1

As described above, in paragraph No. [0012] of the publication 1, it is stated that "in a shell body tube 31, both ends of a group of heat exchanger tubes 32 are stabilized by brazing or welding with a plate metal tube sheet 33 and, on the other hand, the outer periphery of the tube sheet 33 is fixed and arranged by brazing or welding with an inner wall 34 of the tube 31, ...." Here, the shell body tube 31, the heat exchanger tube 32 and the tube sheet 33 correspond, respectively, to the housing casing (2), the exhaust pipe (10) and the pipe base (7) of claim 1 of the present application. Further, in the publication 1, the heat exchanger tube 32 is welded to the tube sheet 33 at both sides of the shell body tube 31, which is the same structure as "which is arranged at the end" recited in the claim 1 of the present application.

In addition, in the publication 1, the periphery of the tube sheet 33 is welded to the inner wall 34 at the end portion of the shell body tube 31. That is, the tube sheet 33 is welded to the shell body tube 31 via the welded portion at the end of the shell body tube. Further, the welded portion corresponds to the "circumferential band" in the claim 1 of the present application.

Consequently, since the publication 1 describes the invention described in the claim 1 of the present application, the invention described in the claim 1 of the present application is the same as the invention described in the publication 1, and thus has no novelty. Even if it has novelty, it is an invention that would have been obvious to a person of ordinary skill in the art on the basis of the content of publication 1.

Next, the publication 3 belongs to the same technical field as the exhaust gas heat exchanger for motor vehicles, which is the object of the present invention, because it discloses a heat exchanger for a water heater or a hot-water boiler in which heat exchange is carried out between exhaust gas and water.

As described above, in page 1, line 1 from the bottom to page 2, line 16 of the publication 3 it is stated that "The flue type heat exchanger shown in Fig. 2 has fundamental structure described below. That is, the inside of a heat exchanger main body 1 is provided with a water channel 4 formed along the periphery of the main body 1 between an outer barrel 2 and an inner barrel 3, and a flue 5 formed heat-conductively to the water channel 4 inside the inner barrel 3. At the under portion of the outside of the main body 1, a water supply port 6 leading to the water channel 4 and a burner port 7 are welded, and at the upper portion thereof, a drain port 8 leading to the water channel 4 and an exhaust port 9 leading to the flue 5 are welded. In the water channel 4, water 10 is filled, which becomes hot water by heat having been generated by a gas burner 11 thrown through the burner port 7 and ignited and transmitted via the inner barrel 3." And further, as is clear from Fig. 4, the end plate 12 and the outer barrel 2, and the end plate 12 and the inner barrel 3 are TIG

welded at the end to form welded portions 15, 15.

The outer barrel 2 and the end plate 12 of the publication 3 correspond to the housing casing (2) and the pipe base (7) of the present application, respectively, and the inner barrel 3 corresponds to the exhaust pipe (10) of the present application. That is, the inner barrel 3 corresponds to one exhaust pipe (10) having a great diameter. Further, since the end plate 12 is welded to the outer barrel 2 via a circumferential joint, the welded structure in Fig. 4 of the publication 3 is substantially the same as the structure of claim 1, considering that the welded structure in Fig. 4 has the same working-effect as that of the present case. That is, similar to the present invention, welding of a circumferential bead and welding of an exhaust pipe can be carried out from the bottom side of the pipe.

Furthermore, as described above, in page 2, beginning at line 5 from the publication 3 it is stated that "The smoke tube type heat exchanger shown in Fig. 3 is constituted such that the water channel 4 heat-conductively surrounds side peripheries of plural smoke tubes 11 . . . , whereby water 10 flown into the water channel 4 from the water supply port 6 at the under portion of the main body becomes hot water. In Fig. 3, 7 and 9 show a burner port and an exhaust port, respectively, communicating to the smoke tube 11 . . . ." The end plate 12, the plural smoke tubes 11 and the outer barrel 2 of the structure in Fig. 3 correspond, respectively, to the pipe base (7), the plural exhaust pipes (10) and the housing casing (2) of the present invention. Although there is no drawing of the bonding state of these pipes, it can be assumed that the state is the same as that of corresponding Fig. 1 A, and that it is the same as that in Fig. 4 showing details of A. In this case, the structure of the

invention concerned is substantially the same as that in Fig. 3 of the publication 3. Further, the invention concerned could be easily invented from the combination of Figs. 3 and 4 of the publication 3.

Consequently, since the invention described in the claim 1 of the present application is described in the heat exchanger of Fig. 2, the example in Fig. 4 and Fig. 3 of the publication 3, the invention described in the claim 1 of the present application is the same as the invention described in the publication 3 and has no novelty. Even if it has novelty, it is an invention that would have been obvious to a person of ordinary skill in the art on the basis of the invention described in the publication 3.

### Claim 2

The invention recited in claim 2 of the present application is characterized, with respect to the invention recited in claim 1, in that "the pipe bases (7) have a raised rim (7a), and the housing casing has ends (3b) in that the rims (7a) and the ends (3b) are arranged flush and are connected by means of the circumferential bead (11)."

On the other hand, in the fixing method of the end portion in the EGR gas cooling system (a variation) shown in Fig. 4 of the publication 1, the outer periphery end of tube sheet 33 is bent parallel to the center line of the shell body tube 31 and the outer periphery surface of the bent portion is fixed to the inner periphery surface of the shell body tube 31 at the end portion thereof. The bent portion of the tube sheet 33 corresponds to "a raised rim (7a) of the pipe base (7)" in claim

2 of the present application.

In this connection, fixing of the end portion in Fig. 4 is carried out by engagement; however, it is assumed that the engage method is employed only as an effective fixing method taking advantage of figure characteristic of the bent portion. Since Fig. 4 is a variation of Fig. 1, fixing by a welding method similar to Fig. 1 would have been obvious to a person skilled in the art.

Consequently, since the invention recited in claim 2 of the present application is substantially described in the publication 1, the invention recited in claim 2 of the present application is substantially the same as the invention described in the publication 1, and thus has no novelty. Even if it has novelty, it is an invention that would have been obvious to a person of ordinary skill in the art on the basis of the invention described in the publication 1.

Next, in A of Fig. 2 and Fig. 4, which is an enlarged drawing of Fig. 2, of the publication 3, the end plate 12 (corresponding to the pipe base (7)) has the raised rim at peripheral border thereof, the rim and end of the outer barrel 2 (corresponding to the housing casing) being arranged flush and connected via the circumferential bead 15. Further, as mentioned above, regarding the outer peripheral shape of end plate 12, in page 3, beginning at line 6 of the publication 3 it is stated that: "the end plate is formed by press-processing a metal plate such as stainless alloy into a cross-sectional shape of letter U." Furthermore, in page 3, beginning at line 1 from the bottom of the publication 3, regarding Fig. 4, it is stated that: "the outside part 13 and the outer barrel 2, and the inside part 14 and the inner barrel 3 are surface-contacted with each other, respectively, over the

range referred to as B in the drawing (around 5 mm) so as not to generate a gap." The aforementioned "a metal plate into a cross-sectional shape of letter U" and "the range referred to as B in the drawing" correspond to "a raised rim (7a) of the pipe bases (7)" in claim 2 of the present application.

Consequently, since the invention recited in claim 2 of the present application is substantially described in the publication 3, the invention recited in claim 2 of the present application is substantially the same as the invention described in the publication 3, and has no novelty. Even if it has novelty, it is an invention that would have been obvious to a person of ordinary skill in the art on the basis of the invention described in the publication 3.

### Claim 3

As mentioned above, the invention recited in claim 3 of the present application is: "A method for production of an exhaust gas heat exchanger as claimed in claim 1, characterized in that pipes (24), pipe bases (22, 23) and the housing casing (21) are joined to form a heat exchanger block (20', 20''), in that the block (20', 20'') is held in a clamping apparatus, and in that both the housing casing (21) and the pipe bases (22, 23) as well as the pipes (24) and the pipe bases (22, 23) are welded to one another at the ends in a jig."

In the publication 1, although there is no specific description about a welding method at the end portion, it would have been obvious to a person of ordinary skill in the art that in such welding, as a matter of course, a group of heat exchanger tubes 32, the tube sheet 33 and the shell body tube

31 are positioned with one another, followed by fastening and fixing this block with some holding device to carry out welding.

Consequently, the invention recited in the claim 3 of the present application is an invention that a person skilled in the art on the basis of the invention described in the publication 1.

Further, as mentioned above, regarding an assembling method of the heat exchanger, in page 3, beginning at line 3 from the bottom of the publication 3, it is stated that "Here, regions referred to as 15, 15 in the drawing are welded portions. The end plate 12 is press-fitted between the outer barrel 2 and the inner barrel 3, whereby the outside part 13 and the outer barrel 2, and the inside part 14 and the inner barrel 3 are surface-contacted with each other, respectively, over the range referred to as B in the drawing (around 5 mm) so as not to generate a gap." From this description, it is described that the welded portion 15 is formed under such conditions that the end plate 12 (corresponding to the pipe base (7)), the outer barrel 2 (corresponding to the housing casing) and the inner barrel (corresponding to the pipe) are fastened themselves all together by press-fitting.

Consequently, the invention recited in the claim 3 of the present application is substantially described in the publication 3, i.e., the invention recited in the claim 3 of the present application is substantially the same as the invention described in the publication 3 and thus has no novelty. Even if it has novelty, it is an invention that would have been obvious to a person of ordinary skilled in the art on the basis of the invention described in the publication 3.

Claim 4

As mentioned above, the invention recited in claim 4 of the present application is: "The method as claimed in claim 3, characterized in that the end welding is carried out by means of at least one laser beam (27, 29)."

As mentioned above, the publication 2 discloses carrying out welding at the end portion of a heat exchanger by at least one laser beam.

Consequently, the invention recited in claim 4 of the present application is an invention that would have been obvious to a person of ordinary skill in the art by applying the invention described in the publication 2 to the invention described in the publication 1.

Further, in the publication 3, the end plate and the outer barrel and inner barrel of a heat exchanger are joined by TIG welding. That is, in page 3, beginning at line 7 of the publication 3, it is stated that "Fig. 4 represents an enlarged drawing of the part surrounded by circle A in Fig. 2. The end plate 12 is TIG welded to the outer barrel 2 and inner barrel 3 at respective end portions of opposing outside part 13 and inside part 14. Here, regions referred to as 15, 15 in the drawing are welded portions." Therefore, it would have been obvious to a person of ordinary skill in the art to carry out welding by laser beam as in the invention of the present application in place of this TIG welding.

Consequently, the invention recited in claim 4 of the present application is an invention that would have been obvious to a person of ordinary skill in the art by applying the invention described in the publication 2 to the invention described in the publication 3.

Conclusion

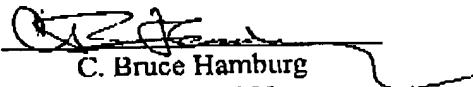
The invention recited in claim 1 or claim 2 of the present application is substantially the same as the invention described in the publication 1 or the publication 3 and has no novelty. Even if it has novelty, it would have been obvious to a person of ordinary skill in the art on the basis of the publication 1 or the publication 3, or combination thereof. Consequently, the invention recited in claim 1 or claim 2 of the present application is an invention that is unpatentable the provisions of 35 U.S.C. 102(a) and/or 35 U.S.C. 102(b) and/or 35 U.S.C. 103(a).

The invention recited in claim 3 is an invention that would have been obvious to a person of ordinary skill in the art on the basis of the invention described in the publication 1 or the publication 3, or combination thereof. Consequently, it is an invention that is unpatentable under 35 U.S.C. 103(a).

The invention recited in claim 4 is an invention that would have been obvious to a person of ordinary skill in the art on the basis of combination of the inventions described in the publication 1 and the publication 2, or a combination of these and the invention described in the publication 3. Consequently, it is an invention that is unpatentable under 35 U.S.C. 103(a).

Respectfully submitted,

JORDAN AND HAMBURG LLP

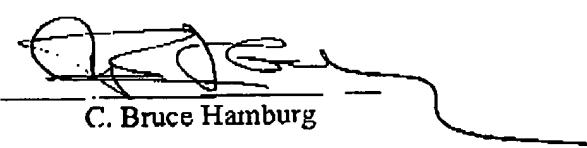
by 

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Certificate of Service

I hereby certify that a copy of this Protest Under 37 CFR 1.291, and the attachments thereto referenced to therein were served upon applicants by mailing copies thereof to their attorneys in this application by first class mail on the 9th day of March, 2006, addressed to Foley and Lardner, Suite 500, 3000 K Street N.W., Washington, D.C. 20007.

  
C. Bruce Hamburg